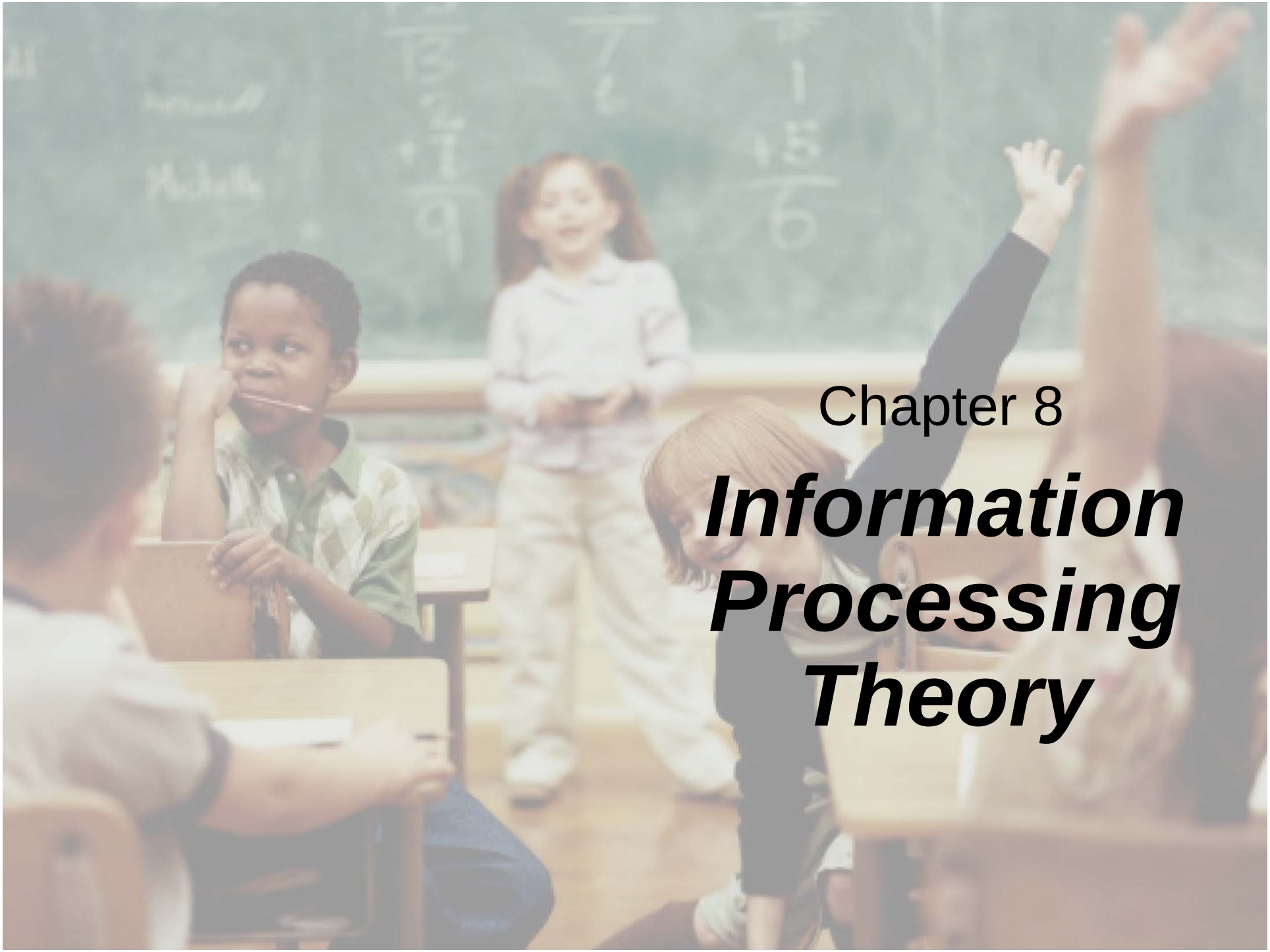

Chapter 8

Information Processing Theory

SHOUT
SHARE
IT

Overview

- The Information Processing View of Learning
- A Model of Information Processing
- Metacognition
- Technology As an Information-processing Tool

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The Information Processing View of Learning

- Assumptions
  - Information is processed in steps or stages
  - There are limits on how much information can be processed at each stage
  - The human information processing system is interactive

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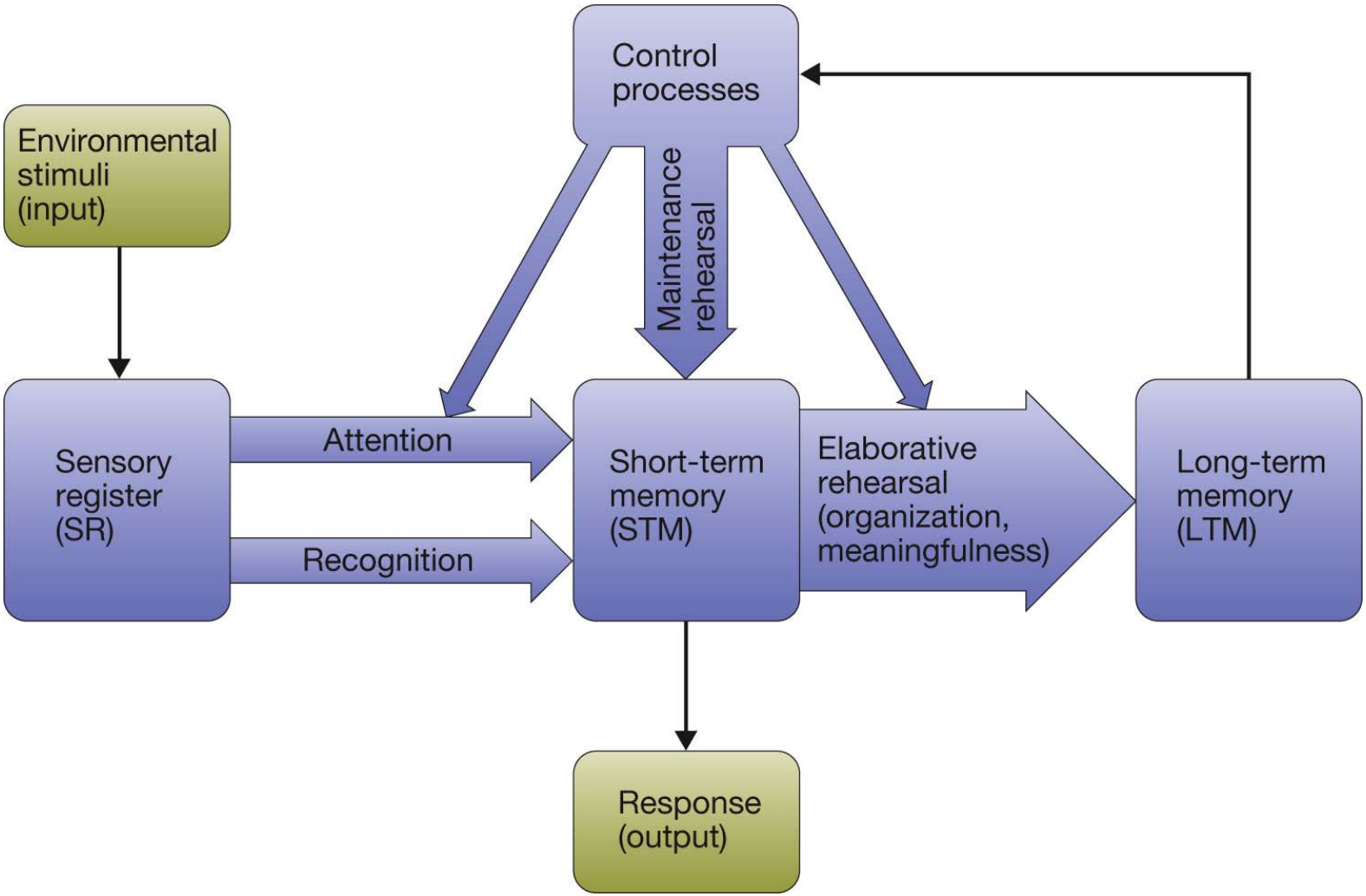
A Model of Information Processing



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A Model of Information Processing

- The Sensory Register
  - Capacity
    - Very large
  - Duration
    - 1 to 3 seconds
  - Contents
    - Raw sensory data (encoded in same form as perceived)

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A Model of Information Processing

- The Nature of Recognition
  - Noting key features of a stimulus and relating them to already stored information
- The Impact of Attention
  - Selective focusing on a portion of the information currently stored in the sensory register
  - What we attend to is influenced by information in long-term memory

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A Model of Information Processing

- Short-Term Memory
  - Capacity
    - 7 +/- 2 chunks of information
  - Duration
    - 20 to 30 seconds
  - Contents
    - What you are currently thinking about (information from the sensory register and information from long term memory)

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A Model of Information Processing

- Rehearsal
  - Maintenance Rehearsal (rote rehearsal, repetition): Information is repeated over and over again with no effect on long-term memory storage
  - Elaborative Rehearsal (elaborative encoding): New information is related to knowledge already stored in long-term memory

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Video: Cooperative Learning in the Elementary Grades: Jigsaw Model

PLAY

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A Model of Information Processing

- Organization
  - Putting interrelated pieces of information into chunks
- Meaningfulness
  - When new material can be related to information in long-term memory
- Visual Imagery Encoding
  - Generating images in your mind of objects, ideas, and actions
    - – Dual coding theory

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Implications for Instruction: Short-Term Memory and Its Control Processes

Research Findings	Implications
Rehearsal prevents the quick disappearance of information from short-term memory. Most children do not begin to rehearse on their own until about age seven.	All children, especially younger ones, can benefit from being taught rehearsal techniques.
Organization of material into chunks makes it much easier to remember.	Teachers can aid students by presenting material in logical chunks and by showing students how to organize information on their own.

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Implications for Instruction: Short-Term Memory and Its Control Processes

Research Findings	Implications
Meaningful learning occurs when the learner relates new information to prior ideas and experiences.	Teachers should mediate learning by relating new information to students' cultural knowledge and by helping students to learn techniques of self-mediation.
Visual imagery is easier to recall than abstractions.	Teachers should help students develop learning skills that incorporate visual imagery and other memory-aiding techniques.

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A Model of Information Processing

- Long-Term Memory
  - Capacity
    - Unlimited
  - Duration
    - Permanent, long-term
  - Contents
    - Schemata

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A Model of Information Processing

- How Information is Organized in Long-Term Memory
  - Schemata
    - Interrelated networks of associated ideas into which new knowledge is assimilated

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A Model of Information Processing

- How Well Do We Remember What We Learn in School?
  - More than 7 out of 10 studies reported less than a 20% loss of what was learned.
  - Subject matter that had a higher than average level of unfamiliar facts and for which students would have little relevant prior knowledge was associated with increased levels of forgetting.
  - Most of the forgetting of information occurred within 4 weeks after the end of a unit of instruction.

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A Model of Information Processing

- How Well Do We Remember What We Learn (cont'd)?
  - Less forgetting occurred among students who learned the material to a high level either by being required to achieve a high score, teach it to less knowledgeable students, or take advanced courses.
  - Less forgetting occurred in classes where students were more actively involved in learning.

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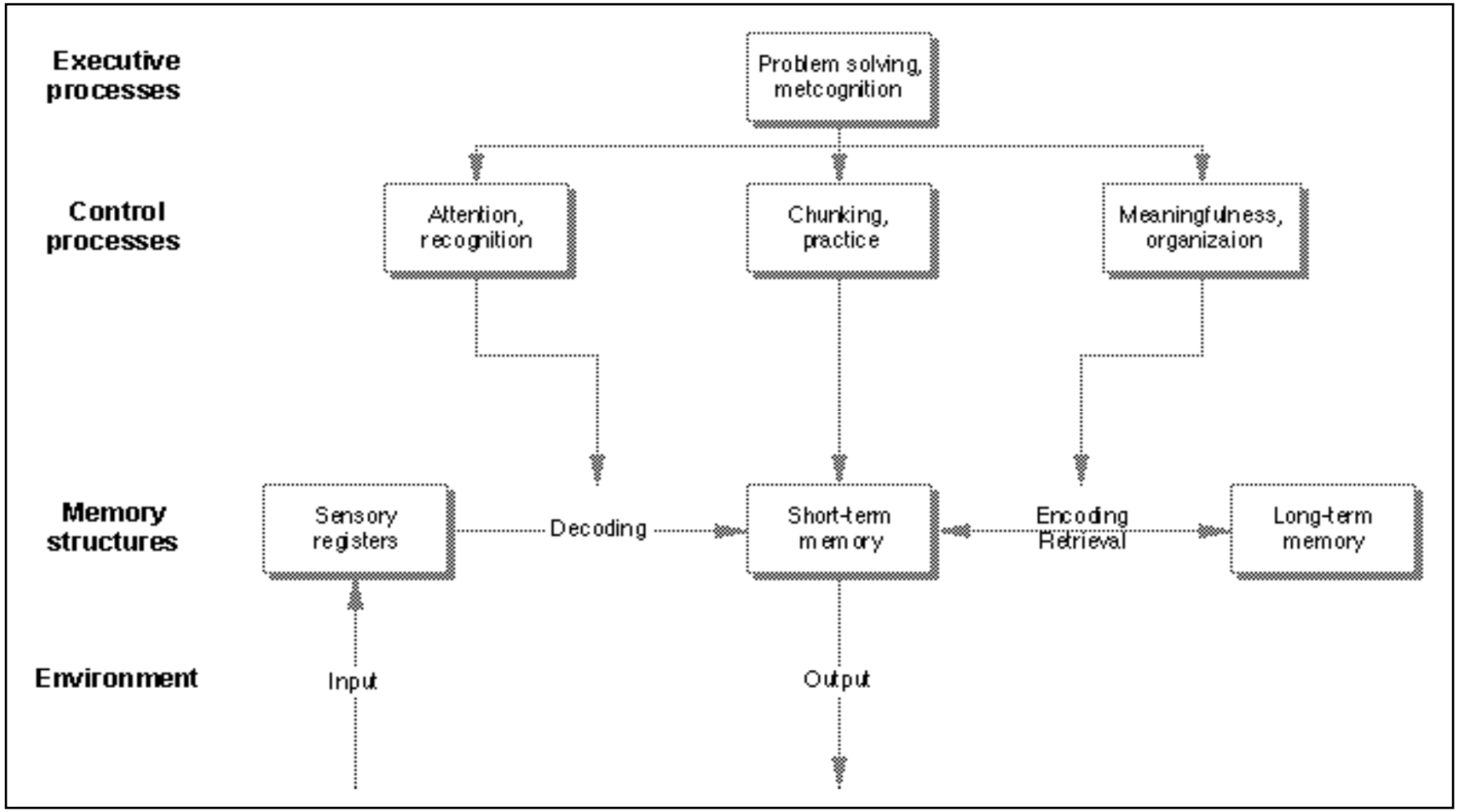
The Governance of Memory



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Metacognition

- The Nature and Importance of Metacognition
  - Metacognition is our knowledge about attention, recognition, encoding, storage, and retrieval and how those operations might best be used to achieve a learning goal

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Metacognition

- The Nature and Importance of Metacognition
  - contains what we know about how person variables, task variables, and strategy variables affect learning
  - thus determines the extent to which students can be strategic learners

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Metacognition

- Age Trends in Metacognition
  - Primary grade children have limited knowledge of:
    - their memory capability
    - factors that affect reading comprehension and recall
    - the need to tailor learning tactics to task demands
    - when they have learned something well enough that they can pass a test
  - Metacognitive knowledge develops with age, experience, and instruction

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Technology as an Information-Processing Tool

- Technology Tools for Writing
- Technology Tools for Reading
- Technology Tools for Science and Math
- Technology Tools for Art and Music
- Multimedia, Hypermedia, and Virtual Environments

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